

CYSTITIS IN
WOMEN.

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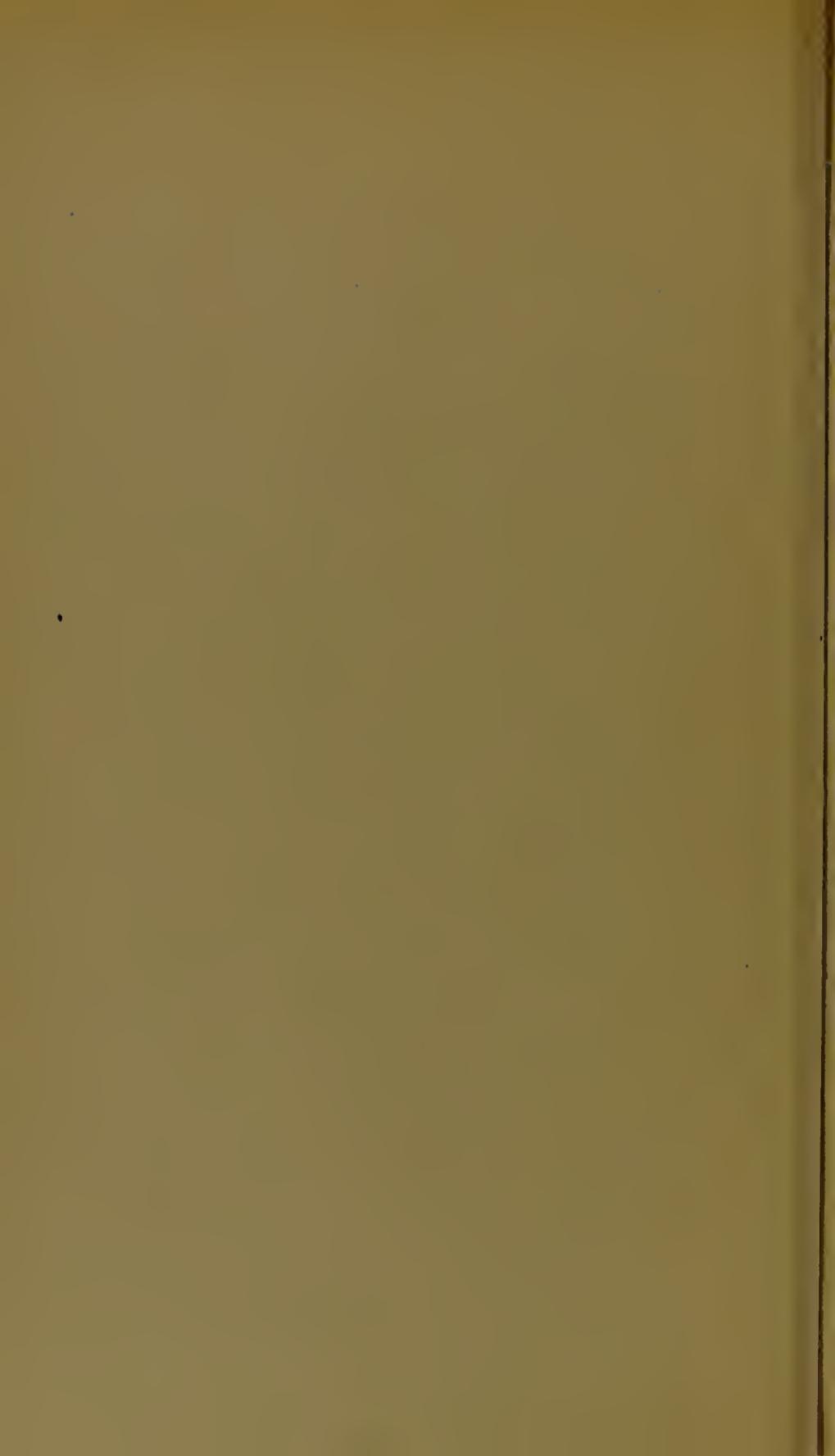
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CYSTITIS IN WOMEN.

WITH REPORT OF FORTY-FIVE CASES, STUDIED CYSTOSCOPICALLY AND SOME MODIFICATIONS OF TREATMENT.

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THE modern treatment of cystitis is the product of recent years; its development has depended upon the improvement in the structure of the cystoscope and the increase in skill and knowledge of its use. Before the interior of the bladder could be inspected and the pathological lesion observed, treatment of such conditions had to be, of necessity, empirical and indefinite. But with modern methods of diagnosis, direct inspection of the site of inflammation and visual knowledge of the effects of treatment, it is possible to control and to cure affections of the bladder in a direct and efficient manner. The ease with which the bladder may be inspected and the small amount of harm and discomfort of the cystoscopic examination in skilled hands are potent factors in the diagnosis, treatment, and cure of cystitis in women. It is thus possible to make an exact diagnosis of the bladder lesion, and appropriate treatment may be directed towards it.

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If, however, no cystoscopic examination is made in cases of cystitis, it is impossible to localize the site of inflammation, acquire any knowledge of its size and location, or eliminate grave and dangerous affections of the kidney and adjacent organs. Many bladder and kidney lesions may produce mild symptoms, yet be of such a momentous character as to make their early diagnosis a necessity for the welfare of the patient.

It is possible with the cystoscope to detect the presence of inflammation by the appearance of the bladder; ulcers and tumors of the bladder wall are readily seen and treated, and the source of blood in the urine, that most important symptom in genito-urinary conditions, may be definitely located and appropriately treated. An intelligent prognosis cannot be reached without a definite diagnosis of the bladder and kidney condition, and this cannot be done without visual inspection of the bladder wall and the ureteral orifices; it is often necessary in addition to catheterize the ureters and obtain urine from each kidney for examination. None of the newer methods of urine examinations, as cryoscropy, estimation of functional capacity of the kidney by methylene blue, etc., can take the place of ureteral catheterization in the study of surgical lesions of the kidney, as none of them is exact and accurate. The instruments for segregation of the urine by means of the formation of an artificial partition in the bladder, as by Luys'¹ segregator, or by means of pressure upon the ureters through the abdominal wall as by Heusner's² separator, are not to be depended upon for accurate division of the urines from the kidney, and have the additional fault that the resultant urine may suffer contamination from the bladder wall.

The cause and progress of the bladder disease and the effect of treatment upon the condition may be minutely followed by the cystoscope. Treatment may be changed to suit conditions that may arise and harmful procedures may be eliminated.

The ease and painlessness of cystoscopic examination eliminates the main argument against its use. In none of the following forty-five cases of bladder disease was the urethra or bladder cocaineized. This includes several hundred examinations, as it was the custom to note the bladder condition cystoscopically at each treatment. In several cases, on account of the painful character of the lesion and the marked alteration in the bladder wall, opium suppositories were required to control the pains following bladder distention with the irrigating fluid. For inspection of the bladder with the examining cystoscope no dilatation of the urethra is necessary, save occasionally in virgins with a very small meatus. The instrument used for catheterization of the ureters occasionally requires slight dilatation of the urethra.

Cystoscopic examination should cause little or no pain, and no ill effects to the patient or to the patient's condition. No injury or ill effects from the examination alone were noted in any of these cases.

The instruments may be sterilized in formalin vapor or by scrubbing with tincture of green soap and placing in carbolic acid solutions. The ureteral catheters may be sterilized in formalin vapor or, as is the writer's custom, boiled in a saturated solution of common salt in water. Another useful solution for boiling catheters is saturated solution of ammonium sulphate in water; but this, while slightly prolonging the life of the catheters, causes crystals of the salt to be deposited on them during cooling.

The common salt solution is convenient and efficient, one catheter of the writer having been boiled in this way eighteen times, before the silk and gum tissue became markedly injured.

The cystoscopic instruments used were a simple, indirect examining cystoscope of the Nitze type, the Tilden Brown catheterizing cystoscope, and the Kelly cystoscope as modified by Cullen. Other instruments were used experimentally, but the above were those constantly in use.

For diagnostic and catheterizing purposes water dilatation of the bladder was the rule. The patient was in the lithotomy position upon a gynecological examining table. If it was necessary to examine the bladder with the Kelly instrument for applications and other purposes, the hips were elevated, or the patient put into the knee-chest position, in order to get air inflation of the bladder.

The cases noted in this paper were all examined in a public clinic (Vanderbilt Clinic), and the fact that they returned for treatment is evidence of the lack of discomfort that the examination caused. The writer is indebted to Drs. Healy, Proben, Roff, Stone, and Meeker for referring these cases. The following abstracts of the histories of forty-five cases note the more important conditions found at cystoscopic examinations. The discussion of the cases follows their citation. Frequency of urination was the most common symptom which caused a cystoscopic examination to be made. This frequency in the histories is estimated in amount by the number of times a woman has to arise at night to urinate.

Clinic No. 44,529.—Frequency; pain; urgency. No return urgency. Right cystic ovary. Cystoscopic examina-

tion. Sclerotic stricture of the urethra. Chronic atrophic cystitis. Chronic hypertrophic trigonitis.

Clinic No. 46,270.—Frequency 3 to 4 times at night. Cystoscopic examination. Atrophic cystitis. Hyperemia of trigone. Diverticula of bladder.

Clinic No. 46,067.—Frequency 3-4. Cystoscopic examination. Calculous urethra. Loss of sphincter control. Acute hyperemic cystitis.

Clinic No. 43,833.—Frequency 1-2; pain; urgency. Symptoms date from operation of abdominal suspension for retroversion two years ago. Pain on left side. Cystoscopic examination. Bladder divided into two sacs by partition, which occupies the mid-line and corresponds to suspension ligament. Chronic hypertrophic trigonitis. Atrophic cystitis.

Clinic No. 44,995.—Frequency 3-5; pain; urgency. Uterus retroverted. Cystoscopic examination. Acute hyperemic trigonitis. Benefited by replacement of the uterus without further treatment and cured by bladder treatment.

Clinic No. 45,498.—Frequency; bearing-down pain; burning; urgency for two years. Left pyosalpinx. Endocervicitis and cervical enlargement. Cystoscopic examination. Acute purulent cystitis with marked hyperemia and edema of mucous membrane.

Clinic No. 45,500—Frequency; burning and painful urination for three years, since birth of child. Frequency worse for last two months. Cystoscopic examination. Chronic hypertrophic trigonitis, with marked epithelial proliferation and definite reddening and localized inflammation of right ureteral orifice. Catheterization of kidney showed no tubercle in kidney urine.

Clinic No. 45,465.—Pain in back. Frequency for four years. No burning or urgency for last three years. Cystoscopic examination. Chronic atrophic trigonitis.

Clinic No. 45,499.—Pain in hypogastrium. Frequency 1-3; slight urgency. Left cystic ovary. Lactation atrophy of uterus. Endocervicitis and enlargement of cervix. Cystoscopic examination. Chronic atrophic cystitis. Chronic congestive trigonitis.

Clinic No. 45,379.—Slight, burning. Frequency 1-3. Marked frequency in day. Return urgency. Endocervicitis and cervical enlargement. Cystoscopic examination. Chronic congestive cystitis. Chronic hyperemic trigonitis. Urteral orifices normal.

Clinic No. 45,310.—Frequency, pain and urgency for

six months. Has had frequency occasionally during last three years. Fibroma of cervix. Cystoscopic examination. Chronic atrophic cystitis, which is most marked where the cervical tumor bulges into the bladder. Acute hyperemic trigonitis. Both ureteral orifices inflamed and reddened. Catheterization of ureters showed kidney urine normal.

Clinic No. 43,919.—Frequency 2-4; urgency; moderate pain for six months. Bilateral salpingitis. Endocervicitis. Cystoscopic examination. Marked congestive hypertrophic cystitis. Large hypertrophied cervix uteri bulges into the bladder and keeps right ureteral orifice open.

Clinic No. 41,600.—Frequency and pain for one year. Blood in urine. Enlarged cervix, with endocervicitis. Cystoscopic examination. Chronic exfoliative cystitis in patches. Right ureteral orifice irritated and inflamed. Small ulcer undermined and serpiginous immediately above the orifice. Ureters catheterized, but no tubercle found in kidney urine

Clinic No. 44,797.—Frequency, urgency, and pain for three years. Large uterus slightly prolapsed. Large cervix. Cystoscopic examination. Chronic hyperemic cystitis. Chronic exfoliative trigonitis.

Clinic No. 43,645.—Marked frequency, pain, and urgency for twenty years. Frequency often 10-20 times at night. Cystoscopic examination. Chronic hypertrophic cystitis. Marked chronic trigonitis.

Clinic No. 44,818.—Frequency and burning only when walking about. None at night. Cystoscopic examination. Marked urethritis. No inflammation in bladder save a little near outlet.

Clinic No. 44,862.—Slight frequency and pain on urination. Cystoscopic examination. Moderate atrophic cystitis. Upon left side are two ureteral orifices lying side by side, each of which extends to kidney, as methylene blue injected through one ureteral catheter flows out of the other.

Clinic No. 44,393.—Marked frequency, pain, urgency, and return urgency for two months. Bloody urine. Cystoscopic examination. Acute hyperemic cystitis, with bleeding granulations and a great deal of exfoliation. Ureteral orifices not inflamed more than the rest of the bladder. Ureter catheterized and kidney urine negative for tubercle.

Clinic No. 44,186.—Frequency 1-2 and slight urgency

for four months. Right floating kidney. Perineorrhaphy four years ago. Moderate cystocele. Cystoscopic examination. Marked chronic trigonitis. Slight chronic cystitis. Right ureteral orifice reddened. Ureters catheterized and kidney urine negative for tubercle.

Clinic No. 43,700.—Age 19. Frequency 5-6. Urgency, pain, and return urgency for six months. Pain in right side for three weeks. Lost ten pounds in three weeks. Headache. No abdominal pain. Much pus in urine. Tubercle bacilli and long grooved angular leucocytes found in urine; their protoplasmic outline irregular and swollen. Vacuoles and detached nuclei in leucocytes. Many red corpuscles. Cystoscopic examination. Acute hyperemic exudative cystitis with several small ragged undermined ulcers. Right ureteral orifice markedly inflamed and left orifice slightly inflamed. Ureters catheterized. Tubercle bacilli, pus, and red cells found in right kidney urine, but left kidney urine clear. Nephrectomy by Dr. Blake showed right kidney with marked tuberculous disease. Bladder cleared up under treatment after operation. Patient gained forty pounds in six weeks following operation and was perfectly well in two months.

Clinic No. 45,672.—Age 23; three miscarriages. Frequency 2-3; urgency and pain for one year. Blood and pus in urine. Cystoscopic examination. Marked hyperemic cystitis with exfoliation and small ulcers with undermined edges around the right ureteral orifice. Right ureteral orifice markedly inflamed. Left ureteral orifice irregular, with some swelling and redness of the edges and slight congestion of the surrounding mucous membrane. There were a few reddish excrescences. Ureters were catheterized. Tubercle bacilli and pus found in the right kidney urine, and left kidney urine was clear. Nephrectomy refused. Bladder improved under treatment.

Clinic No. 46,343.—Age 16. Left tuberculous hip-joint disease with marked deformity. Frequency and pain on urination for three months. Cystoscopic examination. Moderate hyperemic cystitis with small, clear tuberculous-like fine gray points, surrounded by a reddish zone of congestion and inflammation. The whole mucosa is injected and swollen. Ureteral orifices are apparently normal. Pus and tubercle bacilli in urine. Ureters were catheterized and kidney urine from both sides was found to be without pus or tubercle; so it was concluded that the disease was primary in the genitourinary tract and was due to miliary

extension from focus in the hip. The bladder condition improved somewhat under treatment.

Clinic No. 43,857.—Age 23. Hydatidiform mole three months ago. Acute gonococcus vulvitis and endocervicitis. Frequency, pain, and urgency for three months. Cystoscopic examination. Urethral hemorrhage, acute urethritis, acute hyperemic cystitis with bleeding granulations.

Clinic No. 44,146.—Pain, frequency, and burning for three months. Pelvis negative. Cystoscopic examination. Chronic exfoliative cystitis. Blood and pus in urine. Ulcer of the trigone with blood-vessel whose walls may be seen pulsating, running across the raw surface. Right ureteral orifice normal; left slightly reddened. Ureters catheterized. Kidney urine negative for tubercle bacilli.

Clinic No. 46,939.—Pain, frequency, and urgency for two months. Cystoscopic examination. Acute hyperemic cystitis with marked edema and much swelling of the mucosa.

Clinic No. 44,736.—Moderate frequency for eight months. Cystoscopic examination. Chronic atrophic cystitis.

Clinic No. 45,688.—Frequency and pain for six months. Pain on left side and back. Retroversion and endocervicitis. Cystoscopic hypertrophic trigonitis, with moderate edema and exfoliation.

Clinic No. 46,636.—Age 56; menopause at 37 years. Frequency 3-4; urgency and return urgency. Cystoscopic examination. Atrophic cystitis with hypertrophied bands of muscle and connective tissue and small diverticula.

Clinic No. 32,326.—Frequency, urgency, and return urgency. Perineorrhaphy and suspensio uteri three years ago. Cystoscopic examination. Chronic atrophic cystitis. Moderate hyperemic trigonitis. Bladder is distorted and ureteral orifices are displaced by fixed uterus.

Clinic No. 44,900.—Pain on urination and blood in urine for six months. History of syphilis. Pregnant four months. Cystoscopic examination. Marked hypertrophic cystitis with bleeding granulations. Large syphilitic (?) ulcer of fundus of bladder, marked varicosity of veins of bladder. False membrane of ulcer. Ureteral orifices negative. Ureters catheterized and kidney urine negative for tubercle. Bladder wall firm and cannot be distended. Improved under antisyphilitic and bladder treatment.

Clinic No. 44,370.—Frequency, burning, and pain for ten years. Bearing down pain. Cystoscopic examination. Chronic exfoliative cystitis with moderate papillary ex-

crescences and small inflammatory cysts. Ureteral orifices patulous.

Clinic No. 43,735.—Frequency and pain on urination for six years. Operation for cystocele six years ago. Had electrical treatment, static and faradic, three years ago. Cystoscopic examination. Chronic hypertrophic trigonitis in the neighborhood of the scar of the cystocele operation, which can be seen as a ridge in the trigone. Right ureteral orifice inflamed and displaced as a result of the operation. Ureters catheterized and kidney urine negative.

Clinic No. 45,010.—Marked incontinence of retention and frequency for nine years, since complete hysterectomy nine years ago. Cystoscopic examination. Bladder markedly dilated with three large saculations. Chronic hypertrophic cystitis with very great hypertrophy of muscular and connective tissue bands, causing innumerable diverticula, 0.5 to 2.0 cm. deep. Much exfoliation of the mucosa and marked hyperemia. Ureteral orifices displaced, but otherwise negative. The bands of muscle resemble in appearance the columnæ cornæ of the heart valves.

Clinic No. 46,661.—Frequency, pain, and urgency for two years. Worse in last three months. Pregnancy three months. Cystoscopic examination. Severe granular hypertrophic cystitis over the whole bladder, with marked papillary granulations, which bleed easily. Marked exfoliation of mucosa. Ureteral orifices negative. Ureters catheterized, kidney urine negative for tubercle.

Clinic No. 43,815.—Burning and frequency for eighteen months. Worse since pregnancy began four months ago. Cystoscopic examination. Marked hyperemic cystitis. Mucosa soft and granular. Marked congestive magnoitis.

Clinic No. 42,549.—Burning and frequency for two years. Worse since pregnancy in last four months. Chronic endocervicitis. Cystoscopic examination. Marked congestive trigonitis. Ureteral orifices patulous. Cervix bulges into the bladder.

Clinic No. 45,669.—Burning, pain, and slight urgency for three months. Pregnant three months. Cystoscopic examination. Moderate hyperemic trigonitis with congestion of vessels.

Clinic No. 43,821.—Burning and frequency for three months. Pregnant three months. History of pelvic peritonitis and cystitis two years ago. Cystoscopic examina-

tion. Chronic hyperemic cystitis with marked granular trigonitis.

Clinic No. 43,460.—Frequency for two months. Pregnant four months. Cystoscopic examination. Moderate hyperemic trigonitis. Ureteral orifice patulous.

Clinic No. 44,151.—Frequency, pain, and bearing down pain for two weeks. Pregnant three months. Cystoscopic examination. Marked congestive trigonitis; ureteral orifice normal.

Clinic No. 44,442.—Frequency, pain, and urgency for a week. Pregnant two months and a half. Cystoscopic examination. Slight hyperemic cystitis with papular trigonitis.

Clinic No. 42,622.—Frequency, urgency, and pain for three weeks. Pregnant four months. Cystoscopic examination. Moderate congestive trigonitis. Ureteral orifices dilated.

Clinic No. 45,051.—Frequency and pain for one month. Pregnant five months. Cystoscopic examination. Marked hyperemic trigonitis with papillary granulations and softening of the mucosa. Much exfoliation and desquamation.

Clinic No. 45,010.—Frequency and urgency for four months. Pregnant eight and a half months. Pain right side and much pus in urine. Cystoscopic examination. Marked purulent cystitis with papillary granulations, exfoliation, and desquamation. Marked hyperemia and edema of the mucosa. Ureteral orifices patulous. Ureters catheterized, and kidney urine contains no pus. Improved and went to full term under bladder treatment.

Clinic No. 44,688.—Frequency and urgency during last three months. Blood in urine. Pregnant nine months. Pain in abdomen under liver. Temperature 102° , pulse 110. Cystoscopic examination. Marked purulent cystitis with hemorrhagic papules and granulation-like spots. Marked varicose enlargement of the veins of the bladder. hemorrhage from veins. Intense congestion, hyperemia, and edema. Much desquamation and exfoliation. Ureteral orifices patulous, but otherwise negative. Ureters catheterized and kidney urine contained no pus. Bladder improved under treatment and cleared up after delivery.

A short discussion into the pathology of cystitis will be required to explain these findings.

The most common condition of chronic inflam-

mation of the trigone, or trigonitis, is usually one which results from a simple hyperemia and congestion of the vessels; actual infection may precede or follow the congestion. The line of separation between chronic congestion and chronic inflammation of the trigone is often hard to determine. There is usually marked hyperemia with marked dilatation of the blood-vessels. The intimate relation between the vesical arteries and those of the neighboring pelvic organs makes this very easy. The membrane loses its luster, the mucosa becomes reddened and there is evidence of flaky desquamation and exfoliation of epithelial cells, leucocytes, and pus. In a later stage, the mucosa of the trigone becomes velvety in appearance and, in some cases, there are proliferative processes, which may lead to papillary or papilloma-like excrescences. These cases of trigonitis show epithelial proliferation, marked round-celled infiltration, involving particularly the submucosa. In addition to these changes Heyman³ has drawn attention to a change in the epithelial elements from the normal bladder mucosa to flattened epithelium. The epithelium is thickened and papillary projections may rise above the surface. These processes may take alveolar arrangement below the level of the surface.

In chronic cystitis, the changes are more general: the mucous membrane has lost its normal pinky white appearance, and appears more or less generally reddened. This reddening and inflammation may appear generally or only in certain patches, and cases have been noted in this series, in which the inflammation extended in streaks along the line of the blood-vessels of the bladder wall. The mucosa is dull red in appearance and may here and there show small ulcerations. There is frequently

desquamation of the epithelium, and interstitial hemorrhages, showing on the surface, are not uncommon. When there is considerable ulceration and necrosis, membranous or gangrenous cystitis may result.

The muscle of the bladder is sometimes involved in the changes of cystitis and may hypertrophy and enlarge to project into the bladder cavity as thick bundles or network, forming cavities into which the bladder mucosa may penetrate. In one case, No. 45,010, this was associated with marked distention, lack of tone of the bladder wall and incontinence of retention. The muscular bands were as thick as a lead pencil and formed a network. The connective tissue in the muscle bundles increases and there follows a hypertrophic sclerosis of the muscle of the wall.

Chronic atrophic cystitis is not an uncommon condition in women after the menopause, and is often associated with more or less sclerosis of the external genitals, as in Case 44,529, where there was difficulty in urination on account of a sclerotic or atrophic vulvitis, and the white firm tissue around the external meatus constricted the opening to almost pin-point size; but was easily cured by one dilatation of the orifice with steel dilators.

The mucosa in atrophic cystitis is dull and thickened. The blood-vessels are not seen at the fundus and there is often atrophic retraction of the ureteral orifices. This process is usually accompanied by more or less irritating hypertrophic trigonitis. This condition is the most common cause of frequency of urination in women past the menopause.

Inflammation of the bladder is usually effected by congestion of adjacent organs. Thus an endocervicitis with enlargement of the cervix is not an

infrequent accompaniment of a congestive hypertrophic trigonitis. The intimate relations of the cervix and the trigone and their blood-vessels explain this association. The enlarged cervix also often presses upon the trigone which from the existing inflammation has lost its normal elasticity, and this will often cause alteration in the structure of the ureteral orifices, which, from being small elevated papillæ, become stretched, flattened, and elongated. The base of the orifice may often be seen through the patent opening. This condition is also often present during pregnancy where the enlarged cervix bulges into the bladder.

These conditions injure the valve-like power of the ureteral orifice and causes it to allow of regurgitation of urine into the pelvis of the kidney. This may be a cause of pyonephrosis and pyelitis of pregnancy. This regurgitation was well demonstrated experimentally by Sampson,⁴ who obtained it after injuring the ureteral orifices in animals.

Pregnancy, also from the congestion it brings, may be the cause of the recrudescence of an old trigonitis, as was noted in cases 46,661, 43,815, 42,549, 45,669, 43,821, 43,460, 44,151, 44,442, 42,622, and 45,051. In these cases there was in the early months of pregnancy some frequency and urgency of micturition. The increased congestion of the trigone showed very markedly in the engorged arteries, which could be traced upwards from the bladder orifice.

The writer also wishes to draw attention to a peculiarly acute cystitis in the latter months of pregnancy, which was present in two cases: Nos. 45,010 and 44,688. In these cases, both about full term of pregnancy, there was a very acute cystitis with large amounts of pus in the urine. Cystoscopic

examination showed a very inflamed bladder wall with marked edema and hyperemia. The condition was general and uniform. There was marked desquamation and exfoliation of epithelium and pus. The exfoliated cells and shreds clung to the bladder wall like small tags. The picture was that of an extremely acute cystitis with very marked edema and congestion. The mucosa was markedly softened, swollen, and boggy. The amount of pus excreted was great.

In both of these cases examination was made on account of a suspected involvement of the kidney by pyelitis or pyonephrosis of pregnancy. In one there was pain on the right side, which seems to lend color to that diagnosis. However, catheterization of the ureters brought clear urine from the kidneys, eliminating all possibility of suppurating kidney conditions. These two cases gave such a clinical picture of pyelitis that it was only by cystoscopic examination and ureteral catheterization that such condition could be eliminated. The writer does not believe that a diagnosis of pyelitis or pyonephrosis of pregnancy, in the absence of marked renal tumor, can be definitely and accurately made without cystoscopic examination and ureteral catheterization. The place of origin of the pus in the urine must be definitely located. A purulent cystitis frequently accompanies infection of the kidney in pregnancy, and, without cystoscopic examination or the palpation of a marked renal tumor, it cannot be said whether the pus arises from the kidney, the bladder, or both; the microscopical examination of the urine for renal or bladder cells offers no decided proof of either condition. An increase in temperature cannot be taken as a definite guide in the differential diagnosis of these con-

ditions, as, in acute hyperemic cystitis of pregnancy, fever may be present as in case No. 44,688.

In the earlier months, pregnancy has a distinctly evil effect upon old or latent trigonitis. The added congestion of the blood-vessels and effect of the growing cervix bulging into the bladder causes an exacerbation of the condition. The diseased, inelastic trigone is stretched and irritated, and the ureteral openings are altered and distorted.

In one of the cases of pregnancy with cystitis, No. 44,688, there was marked hemorrhage from the bladder. This was due to markedly varicose veins in the bladder. The oozing could be directly traced to the enlarged vein,⁵ although it was also caused by the hemorrhagic granulations. Similar cases have been reported by Kubinyl,⁵ who believes it to be due to the increase in blood pressure and the insufficiency of the valves of the veins. Proust⁶ also reports two such cases in pregnancy, and they state that cystotomy, packing, and even direct ligation of the vein may be required. However, in this case, astringent treatment, while it did not entirely stop the bleeding, permitted the woman to go to term.

In three cases, Nos. 43,700, 45,672, and 46,343, there was tuberculous cystitis. In two cases it was associated with tuberculous disease of the kidney. One case was operated upon, the kidney remained and the cystitis cured; the other refused operation and the bladder was treated locally with small improvement.

The third case was one of tuberculous cystitis, primary in the genitourinary tract, but secondary to an old tuberculous hip-joint lesion. It is very rare in tuberculous genitourinary disease to find the bladder alone involved, as Saxtorph⁷ in 10,016 autopsies found 205 cases of chronic genitourinary

tuberculosis, and amongst these 205 cases there were 52 of secondary implication of the bladder and only one case in which the bladder was alone involved. However, in case No. 46,343 no other focus of tuberculosis could be found in the genitourinary system, and the extensive disease of the hip-joint did not seem to have been communicated to any other organ save the bladder. The uterus and tubes were free, the kidneys did not show any abnormality in urine and the lungs were not apparently involved.

The stage of invasion of the bladder in this case was the very earliest. The little gray white tubercles could be seen, surrounded by a reddish zone of inflammation, and in only two places did there seem to be any breaking down and ulceration. In these places the tubercles had apparently coalesced and formed a small conglomerate mass, which broke down to form an ulcer. The condition improved very slowly under treatment, and the patient is at the present time under observation. The condition of tuberculosis of the bladder is, however, most resistant to treatment, and a cure, except in cases where an involved kidney or other focus is removed, is rare.

Amongst the forty-five cases were four in which the bladder inflammation was the result of or followed upon a previously gynecological operation. Two cases followed suspension of the uterus by the abdominal route. In one case, there was marked sacculation of the bladder with patches of inflammation and congestion; in the other there was considerable distortion of the trigone, alteration in the site of the ureteral orifices, and sacculation of the bladder. In case No. 45,010 there has been a complete hysterectomy for purulent tubal

disease. The bladder was very markedly dilated and would retain 1,500 c.c. The walls were much congested, and the fibers of bladder muscle were separated into a network of firm, stout bands, the largest as great as a lead pencil and the smallest as the lead itself. The mucous membrane dipped into the crevices and the ureteral orifices were much distorted. The bladder was very irregularly dilated and had lost its tone: incontinence of retention was present. This case improved somewhat under dilatation of the urethra and other treatment. Case No. 43,735 had had a cystocele operation, and the scar of the operation wound could be seen within the bladder, although it did not seem to have penetrated the bladder mucous membrane. The left ureteral orifice was displaced and the region of the scar inflamed and congested.

Bladder inflammation following upon gynecological operations is not infrequent and is usually blamed upon a postoperative cystitis; however, it frequently happens that the cause may be more directly laid to the operation itself as in these four cases.

Blood in the urine is said to be an indication of tuberculous genitourinary disease; but in this series it appeared several times when tubercle bacilli could not be demonstrated in the urine. It was due in some cases to a small bleeding ulcer and, in one case of acute cystitis of pregnancy, to bleeding granulations and varicose veins of the bladder. It is, however, a symptom which is a direct and urgent indication for accurate study of the case and visual diagnosis of the lesion by means of the cystoscope.

One case, No. 44,900, showed a large single ulceration of the fundus with marked necrosis and false membrane formation. The bladder was uni-

formly inflamed and markedly contracted. The case was watched and treated throughout pregnancy without benefit; but after delivery slight improvement took place under antisyphilitic treatment. Operation of cystotomy was refused. Curettage of the ulcer was not done on account of the friability of the bladder wall.

The treatment in general of these cases of cystitis consisted of irrigations with a bland cleansing fluid. This solution usually consisted of sodium bicarbonate, one dram to the quart of water. This is a better solvent of mucus, pus, and albuminous substances generally than is the boric acid solution so commonly used. This is well known by otologists, who recognized the value of alkaline solutions in suppurative ear diseases. If there was a great deal of mucus, the solution was made of double strength, and, if there was a great deal of pus, one dram of sodium sulphate was added to the cleansing solution. These mixtures are bland and cleansing, and offer some advantage over the common boric acid solution.

Various antiseptic solutions were tried in the hope of finding one which would give the maximum effect with the minimum amount of disturbance. Rovsing's⁸ carbolic acid solution, five per cent., was tried in the cases of tuberculosis of the bladder and in other chronic cases. It caused a great amount of pain, in one case hemoglobinuria, and did no good. It was tried in all in twelve cases, and only one case was benefited. A number were made worse symptomatically and their condition was not improved. The treatment is one of great severity and often causes intense irritation.

Sublimate solutions were not tried, as the known inefficiency of this antiseptic in the presence of

albuminous matter was considered a contraindication for its use. It has been used by Guyon,⁹ but has not been praised by other surgeons.

In the search for an antiseptic astringent of comparatively unirritating properties, quinine was tried. This substance has distinct antiseptic properties and is said to be placed midway between bichloride of mercury and carbolic acid in its antiseptic properties. It is comparatively unirritating, easily obtained, and may be retained in the bladder without danger. The salt used was the bisulphate, which is easily soluble in water and was made up one dram to the pint. This solution had a distinctly good effect and was the most efficient of the antiseptic solutions used. The few cases reported here cannot be made the basis for the introduction of a new treatment; but the marked improvement in treatment of chronic cases by this solution was encouraging.

Various silver salts were tried and the nitrate was found to be so irritating that its use was discontinued. In the choice of the colloid silver preparations, the experience of chemists and ophthalmologists was considered. It has been found by Derby¹⁰ that of these various preparations argyrol and collargol are inert as bactericides, and that all the colloid silver salts are inefficient in the presence of albuminous matter. The preparations may be divided into three classes: the non-irritating of low bactericidal power, as argyrol and collargol; the more effective and slightly irritating bactericides, as protargol; and the very irritating preparations like nitrate of silver.

It has also been shown by Marshall and Neave¹¹ that the percentage of silver in the compound is no criterion of its antiseptic value. For these rea-

sons, and after some trial of several salts, it was concluded that it was better to have a preparation as protargol with some bactericidal power at the expense of its slightly irritating properties than one like argyrol, which has little or no bactericidal properties and is non-irritating. Protagol, 5 per cent., was by no means used as a routine treatment. It was used in chronic trigonitis for local applications to the inflamed part and as an injection in marked chronic cystitis.

In acute purulent cystitis with exfoliation and pus formation, it was used with hydrogen peroxide as a cleaning and antiseptic combination. It has been shown by Futh¹² that in the treatment of necrotic endometritis and suppurating wounds, if a colloid silver compound is used along with hydrogen peroxide, the action of each is made much more effective. For this reason the two were combined in the treatment of purulent cystitis. Hydrogen peroxide, one-third strength, and protargol, 5 per cent., were injected alternately through a catheter into the bladder by means of a half-ounce syringe. The mixture was allowed to act for a few minutes, then it was washed out by the cleansing solution, injected by the same syringe. No difficulty or trouble was ever noted from distention of the bladder by the peroxide. The peroxide foam poured out of the catheter and was finally washed out by the quinine solution or the cleansing solution. This treatment is not one which would be advised for cystitis in the male, but it has given excellent results in purulent cystitis in the female.

The exfoliation, desquamation, and pus cells are in this way washed away, as they cannot be by any irrigation; the bladder mucous membrane is left clean, and is prepared for treatment by antiseptic

or astringent solutions or for direct applications.

For direct applications to ulcers and localized inflamed spots nitrate of silver fused on a metal probe, or protargol solution on a swab, was used. The patient was put in the knee-chest position, and applications were made through the Kelly-Cullen cystoscope. The place for the application was first located by means of the examining cystoscope under water dilatation.

It was also found that in cases of acute cystitis, or cases where there had been extensive treatment, a soothing application was of benefit. Olive oil was used with some success, but finally a preparation of Irish moss was found to be the most useful. The value of this preparation consists in keeping the bladder walls apart and lubricating them, so that no friction or irritation results. The preparation is approximately the same as many lubricating jellies put up in tubes for use in vaginal examination. This soothing lubricating preparation of Irish moss is also of use in lubricating the cystoscope before its introduction into the urethra. It is prepared as follows:

Chondrus (Irish moss).....45 g.

Distilled water.....1500 c.c.

Wash the Irish moss in cold water, drain off water; wash again and drain. To the washed Irish moss add 1,500 c.c. of distilled water and boil for ten to fifteen minutes, stirring frequently. Strain through muslin with expression. To the strained Irish moss add 4,500 c.c. of boiling distilled water and filter. The process of filtration may be hastened by loosely filling the filter with absorbent cotton. Evaporate the filtrate to one-fifth by bulk, cool partially and add gomonal, 1 per cent. by weight, mix well and strain through fine white flannel which has been

previously boiled. Bottle in ground glass stoppered containers of about half a pint each.

This Irish moss jelly makes a useful lubricant for examinations and may be put up in sterilized metal paint tubes for that purpose. In bladder treatment the jelly should be diluted with hot water to a thick semisolid consistency, fit for use in a syringe.

The treatment of these cases of cystitis consisted mainly in the use of four compounds: the antiseptic quinine solution, the cleansing bicarbonate solution, the peroxide and silver combination, and the jelly of Irish moss. In addition to this, appropriate treatment was directed to ulcers by direct application of silver or curettage, as was required; chronic patches of inflammation were stimulated, and lesions in the neighboring organs were treated.

If the case was one of acute purulent bladder disease, the bladder was first inspected and a diagnosis made, the bicarbonate solution being used as the dilating fluid. The pus and shreds were then washed away by the peroxide and silver combination. The bladder was then washed and dilated by the quinine solution and more exact examination made for small ulcers, patches of inflammation, and the condition of the ureteral orifices. If it were necessary to catheterize the uterus, it was usually done under the quinine solution and after the bladder had been cleansed. It was believed that in this way danger of carrying infection upwards from the bladder was eliminated, the cleansed bladder wall and antiseptic quinine solution removing this small danger. The quinine solution gives a peculiar bluish appearance through the cystoscope, but examinations can be well made with it.

If the case is one of very acute irritation, the Irish moss jelly is injected on removal of the quinine solution. The amount of jelly injected should vary from one to four ounces. If, however, the bladder inflammation is more chronic, the patient is told to retain the quinine solution as long as possible in order to get full benefit from its antiseptic and astringent action.

In chronic cases with much congestion and irritation the peroxide and silver combination was seldom used. The aim of the treatment in all cases was first to cleanse the infected area, to direct appropriate treatment toward the special lesion, and to exercise an antiseptic astringent and stimulating action upon the mucous membranes by means of the quinine solution.

It was also found useful to use various drugs by the mouth. Infusion of buchu and fluid extract of triticum are old favorites and have no equals for making the urine bland and unirritating. Tincture of belladonna and potassium or sodium bicarbonate should be used in combination to relieve spasm and make the urine alkaline. It is required in cases of cystitis that the urine be made alkaline during the irritating stage of the disease. Acid urine is always irritating. The patient should also be directed to drink large quantities of water and a specified amount of six glasses should be named in order that the directions be carried out.

The use of hexamethylene tetramine (urotropin) has not been satisfactory in the writer's experience. It is inert, save when the urine is acid and it makes the urine rather irritating. It is very irritating to the kidney and, when first given, acts as a diuretic; but on continued use may do harm. The writer wishes to sound a note of warning in regard to the pro-

longed use of this drug. Its value in purulent kidney conditions is undoubted; but it is of very little use in cystitis and the continued use may cause kidney irritation and hemorrhagic urine, as has been noted in four cases in the writer's somewhat limited experience. Many additional cases of the toxic effects of this drug have been collected by Beardsley.¹³ Guaiacol is a useful and efficient substitute, but it is also seldom required in cystitis.

The therapeutic value of rest is very great in these cases, and a bland diet with avoidance of acid elements should be ordered. It is also important to remember that the occasion of a cystitis sometimes depends upon a coincident lesion and the bladder inflammation may not react to treatment until that is cured.

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